

P E T I T I O N

1 To the Commissioner of Patents and Trademarks  
Washington, D.C. 20231

5 Your Petitioner, SEAN R. HEISE, a citizen of the United States and a resident of  
the State of Florida, whose post office address is 12000 4th Street North, Apt. 412, St.  
Petersburg, Florida 33716, prays that Letters Patent may be granted to him for the  
improvement in

AN ULTRASONIC REVASCULIZER

as set forth in the following specification.

10 BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention relates to an ultrasonic revasculizer for creating openings in the heart to revasculize infarcted or blocked areas to create collateral blood flow to the damaged area of the heart.

15 2. DESCRIPTION OF THE RELATED ART

It is frequently necessary to create openings in a human heart to enable revasculize infarcted or blocked areas to create collateral blood flow to the damaged area of the heart. In the past, the openings were created in the heart by means of a laser. Although the laser technique does create openings in the heart to revasculize infarcted or blocked areas to create collateral blood flow to the damaged area of the heart, the depth of the opening created by the laser is difficult to control.

## SUMMARY OF THE INVENTION

An ultrasonic revasculizer for creating holes or openings in the heart to revasculize infarcted or blocked areas to create collateral blood flow to the damaged area of the heart is described and includes an elongated handle having first and second ends. An elongated flexible tubular neck has its proximal end secured to the handle and has its distal end positioned remotely from the handle. An enlarged depth guard in the form of a disc is mounted on the distal end of the neck. An ultrasonic needle is selectively longitudinally movably mounted in the neck and extends from the neck and depth guard. A manual control is movably mounted on the handle which is operatively connected to the needle for controlling the selective longitudinal movement of the needle with respect to the depth guard. A depth gauge is provided on the handle adjacent the manual control which indicates the longitudinal position of the needle with respect to the depth guard. The needle is operatively connected to a source of ultrasonic power for ultrasonically driving the needle.

It is a principal object of this invention to provide an improved apparatus for creating holes or openings in the heart to revasculize infarcted or blocked areas to create collateral blood flow to the damaged area of the heart.

A further object of the invention is to provide an ultrasonic revasculizer for creating holes or openings in the heart to revasculize infarcted or blocked areas to create collateral blood flow to the damaged area of the heart.

Yet another object of the invention is to provide an ultrasonic revasculizer which includes an ultrasonic needle selectively movably extending from a depth guard.

1 Still another object of the invention is to provide an ultrasonic revasculizer having  
an ultrasonic needle thereon with the revasculizer including means for controlling the  
depth of penetration of the ultrasonic needle.

5 Yet another object of the invention is to provide an ultrasonic revasculizer for  
creating holes or openings in the heart to revasculize infarcted or blocked areas to  
create collateral blood flow to the damaged area of the heart which is relatively  
economical of manufacture, durable in use, and refined in appearance.

10 These and other objects will be apparent to those skilled in the art.

#### BRIEF DESCRIPTION OF THE DRAWINGS

15 Figure 1 is a perspective view of the ultrasonic revasculizer of this invention with  
the broken lines indicating alternate positions of the flexible neck;

Figure 2 is a side view of the ultrasonic revasculizer of this invention which  
illustrates the depth guard positioned adjacent the human heart with the heart being  
15 indicated in broken lines; and

Figure 3 is a view illustrating the revasculizer of this invention being used to  
create openings or holes in a human heart.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

20 The ultrasonic revasculizer of this invention is generally indicated by the  
reference numeral 10 and includes an elongated handle having ends 14 and 16. The  
exterior surface of the handle 12 is provided with a textured surface generally indicated  
by the reference numeral 18 to enable the surgeon to conveniently grasp the

instrument. As seen in Figure 1, handle 12 includes a recessed portion 20 adjacent end 14 which aids the surgeon in gripping the instrument.

An elongated flexible tubular neck 22 extends from end 14 and has a disc-shaped depth guard 24 mounted on the distal end thereof. An ultrasonic needle 26 selectively movably extends from the depth guard 24 by way of the opening 28 formed in depth guard 24.

The numeral 30 refers to a manual control in the form of a slide button which is selectively movably mounted in slot or opening 32 formed in handle 12. The slide button 30 is connected to needle 26 by any convenient means such as a flexible wire, cable, etc. A depth gauge in the form of indicia 34 is provided on the exterior surface of the handle 12 adjacent the slot 32 for indicating the relative position of the needle 26 with respect to the depth guard 24. As seen in Figure 2, when slide button 30 is in its uppermost position, the needle 26 is fully extended from the depth guard 24. When the slide button 30 is in its lowermost position in the slot 32, as illustrated in Figure 1, the needle 26 is completely withdrawn into the neck 22. The needle 26 is operatively connected to a conventional source of ultrasonic power by means of the cable 36 extending from handle 12. In Figure 2, the numeral 38 refers to the exterior surface of a human heart. In Figure 3, the heart 38 is seen to include Epicardium 40, Myocardium 42 and Endocardium 44. The numeral 46 generally refers to a lesion or blockage in the Epicardial artery.

In operation, when it is desired to create openings or holes in the heart to revascularize infarcted or blocked areas to create collateral blood flow to the damaged

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area of the heart, the patient's chest is normally opened and the neck 22 is inserted  
1 through the chest opening. The instrument is manipulated so that the depth guard 24 is  
positioned adjacent the exterior surface of the patient's heart, as illustrated in Figure 3.  
5 The slide button 30 would initially be preferably positioned in the position as illustrated  
in Figure 1 so that the needle 26 does not extend from depth guard 24. The surgeon  
then actuates the source of ultrasonic power to activate ultrasonic needle 26. When the  
needle 26 has been activated, the slide button 30 is moved upwardly in the slot 32 until  
the needle 26 has penetrated the heart a predetermined amount, as indicated by the  
depth gauge 30.

10 The above-described procedure is repeated until the required number of  
openings or holes have been created in the heart to revasculize infarcted or blocked  
areas to create collateral blood flow to the damaged area of the heart.

15 It can therefore be seen that the use of an ultrasonic needle wherein the depth of  
penetration of the needle in the heart is controlled, thereby overcoming the problem with  
the prior art methods of creating holes or openings in the heart wherein the depth of the  
same was not controlled.

20 Thus it can be seen that the invention accomplishes at least all of its stated  
objectives.